

CLAIM AMENDMENTS

1 1. (Currently amended) A ~~substantially two-phase~~ hard
2 metal substrate body consisting ~~essentially~~ of a WC hard material
3 phase consisting of WC and a binder phase of 3 to 25 mass % which
4 apart from at least one of the binder metals Fe, Co and/or Ni
5 contains up to 15 mass % of a dissolved dopant selected from the
6 group consisting of Al, Cr, V, Nb, Ta, Ti, Zr, and Hf, wherein the
7 percentage proportion of all dopants as a whole in the ~~two-phase~~
8 hard metal substrate body is limited to a maximum of 4 mass %;
9 wherein the proportion of a cubic phase consisting of said dopant
10 in undissolved form in the ~~two-phase~~ hard metal substrate is less
11 than 4 volume % and; wherein the binder metal content in an edge
12 zone of the ~~two-phase~~ hard metal substrate drops to less than half
13 the binder metal content in the substrate body interior.

1 2. (Currently amended) The ~~substantially two-phase~~ hard
2 metal substrate body according to claim 1 wherein the concentration
3 of the binder metal in the binder phase falls gradually toward the
4 substrate body surface and the concentration of the dopant in the
5 binder phase gradually increases in a corresponding manner.

1 3. (currently amended) The ~~substantially two-phase~~ hard
2 metal substrate body according to claim 1 wherein the grain size of
3 the WC is $\leq 1.5 \mu\text{m}$ whereby the WC fine hard material phase (grain

4 size \leq 0.8 μm) and/or with WC ultrafine grain hard material phase
5 (grain size \leq 0.5 μm), preferably contain Cr, V and/or Ta as
6 dopant.

1 4. (Currently amended) The ~~substantially two-phase~~ hard
2 metal substrate body according to claim 1 wherein at least one
3 layer is applied to the substrate body surface, the layer being
4 comprised of a carbide, nitride and/or carbonitride of Ti, Zr
5 and/or Hf and/or of Al_2O_3 , HfO_2 , ZrO_2 , oxides, amorphous carbon,
6 diamond, cubic boron nitride, carbon nitride (CN_x) or another
7 compound of at least one of the elements B, C, N and/or O.

1 5. (currently amended) The ~~substantially two-phase~~ hard
2 metal substrate body according to claim 1 wherein in the boundary
3 zone close to the surface there is an enrichment with nitride or
4 carbonitride of the metal dopant.

1 6. (Currently amended) A method of producing a ~~two-phase~~
2 hard metal substrate body according to claim 1 in which [[the]] a
3 starting mixture consisting of WC, a binder metal, and a dopant is
4 preheated powder metallurgically and is prepressed to a green body
5 and then in an atmosphere of a furnace is heated and sintered,
6 characterized in that wherein in the heating phase, after reaching
7 the eutectic, but no later than reaching the sintering temperature
8 the vacuum or inert gas atmosphere is replaced with a N_2 atmosphere

9 with a N₂ pressure of $\leq 10^5$ Pa and is maintained at least until the
10 sintering temperature is reached.

1 7. (Currently amended) The method of making a two-phase
2 hard metal substrate body according to claim 1 in which the
3 starting mixture is powder metallurgically treated and is pressed
4 to a green body and finally heated in an atmosphere of a furnace
5 and sintered, ~~characterized in that~~ wherein after finish sintering
6 or optionally in a final treatment above the eutectic temperature,
7 the sintered body is maintained in a N₂ atmosphere under a pressure
8 (p) of 10^5 Pa $< p < 10^7$ Pa for at least 10 minutes.

1 8. (Currently amended) The method according to claim 6
2 ~~characterized in that~~ wherein the nitrogen atmosphere is
3 established by introducing precursors that is N-containing gases
4 whereby the nitrogen is formed *in situ* in the gas atmosphere.

1 9. (Currently amended) The method according to claim 6
2 ~~characterized in that~~ wherein the two-phase hard metal substrate
3 body is heated up to 1250°C during the heating phase and this
4 temperature is held for at least 20 minutes, ~~preferably more than~~
5 ~~1 hour~~, before the heating up is continued to the sintering
6 temperature.

1 10. (Currently amended) The method according to claim 6
2 ~~characterized in that wherein~~ initially in the heating up phase at
3 about 1200°C the previously existing vacuum is replaced by an inert
4 gas atmosphere, ~~preferably with a pressure of 103 Pa to 104 Pa and~~
5 only upon reaching the sintering temperature is a nitrogen
6 containing atmosphere established with a higher pressure ,
7 ~~preferably > 104 Pa.~~

1 11. (Currently amended) The method according to claim 6
2 ~~characterized in that wherein~~ the heating up rate and the cooling
3 down rate amounts to up to 10°C/min , ~~preferably between 2°C/min~~
4 ~~and 5°C/min.~~

1 12. (Currently amended) The method according to claim 6
2 ~~characterized in that wherein~~ the starting mixture contains in an
3 amount of up to 15 mass % of the binder phase additional carbides,
4 nitrides, carbonitrides of the elements of Group IVa or VIa of the
5 periodic system or Al or complex carbides, complex nitrides and/or
6 complex carbonitrides of the form Ti_2AlC , Ti_2AlN , Cr_2AlN , Cr_2AlC .